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# Streak Photography: An Exploratory Experiment for Future Display Techniques

Andrew Davidhazy

# STREAK PHOTOGRAPHY

An exploratory experiment for future display techniques

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Candidate for the Master of Fine Arts
College of Fine and Applied Arts
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Advisor: Professor Hans Barschel

DEDICATION

To Lucille, for her
patience and encouragement

# ROCHESTER INSTITUTE OF TECHNOLOGY

ROCHESTER, NEW YORK

## OFFICE MEMORANDUM

To Davidhazy, Andrew Date March 17, 1969

Subject Approval of Thesis Proposal

The Graduate Committee has approved your Thesis Proposal "Streak Photography" and has named Professor Hans Barschel as your Advisor with Professors Remington and Arnold (Photography) as members of your Thesis Committee.

Please see Professor Barschel promptly to arrange a schedule for the orderly development of your Thesis, and remember to follow the guidelines indicated in the HANDBOOK OF GRADUATE STUDY. My secretary, Miss Geroldine Uschold, will furnish you with a xerox copy of the Thesis Procedures Section of the Handbook should you need it.

I am suggesting Charles Arnold as a member of your Thesis Committee, and I hope that he will be willing to serve. If he cannot, you should feel free to suggest the name of a third member of your Committee.

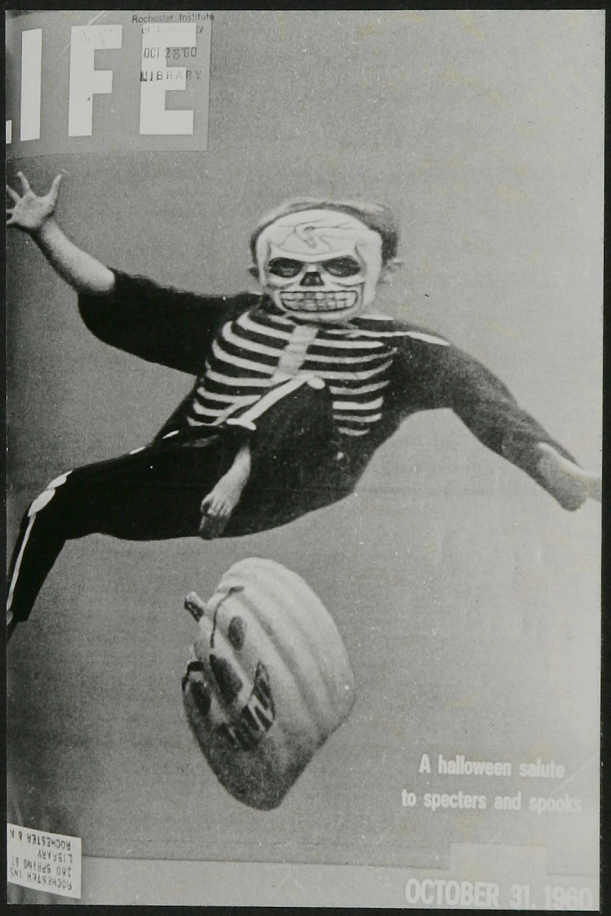
Sincerely,

H.J. Brennan, Dean
College of Fine and Applied Arts

HJB:gu

cc: Graduate File
Professor Barschel
Professor Remington
Professor Arnold

TABLE OF CONTENTS






1

# Introduction

Work in the area of streak photography as a means of artistic expression is not new[1,2] Figure 1. The basic principles of the method have been developed for use in aerial and scientific photography[3,4]. With slight modifications it was adopted by the electronics industry to produce the "wirephoto"[5] and even television.

The two most prominent features of all of the systems based on streak photography is that they are concerned with only a small portion of a subject and that the exposure is continuous in time.

This thesis is not the first attempt by me to understand and use the method. The third figure illustrates the point to which I had developed the method to complete the requirements for a Bachelor of Fine Arts Degree from the School of Graphic Arts and Photography in 1967. The recurring question at the time was whether the results could be predicted with any certainty. The answer was usually vague and negative. This thesis was undertaken to arrive at a better control of the subject. The result to be applied to a further investigation of the potential of the streak method to arrive at new visualizations of inanimate and of human forms.


2

3

## Rotating Turntable and Streak Photography

The system has been widely used to photograph many different types of subject matter. George Silk was intrigued by the possibilities of this tool as a creative medium and applied it to the photography of children and athletic events, Figure 1. Robert Doisneau took the method a step further, but modified the system, by moving the slit instead of the film and placing the subject on a rotating platform, to produce Figure 2. During my first experience with streak photography a similar approach to Silk's was taken to produce Figure 3. With the basis of this knowledge I began to think about a carefully controlled set of conditions which would allow a quasi 3-dimensional photograph to be produced.

The set of conditions needed to produce such a photograph were a combination of Silk's and Doisneau's solutions. A subject would be placed upon a rotating platform. The streak camera, with a vertical slit and horizontal film movement, would be aimed at the turning subject's center of rotation. Since the subject had a significant radius, the image of its surface would appear to move past the very narrow slit placed in the center of the camera's focal plane. If the speed of the film were adjusted to match the speed of the changing image, complete 360° views could be secured after each complete revolution of the subject. It was with this in view that the completion of the project was undertaken.

## Calendar of Procedures

### Mechanics of Streak Photography

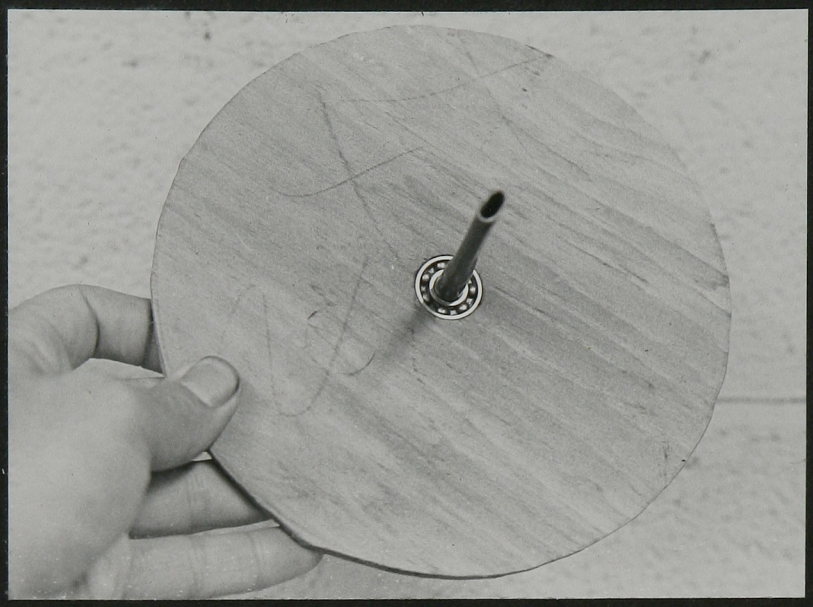
There are two characteristics of streak photography that distinguish it immediately from ordinary instantaneous photographs. The first is that the time at which each vertical segment of a photograph is exposed is different but consecutive from one end of the photograph to the other. This is due to the fact that the film in a streak camera is continually passing at a uniform, preselected speed behind a narrow slit just in front of the focal plane. The approximate exposure time for any film velocity is determined by a knowledge of this velocity, V, (in mm. for instance) and of the width of the slit, D. The equation is

$$E = D/V$$

The second characteristic of a streak photograph is that all objects must be in motion in order to leave an identifiable impression on the film. This is a consequence of the first condition: that the film is in motion. This requirement affects the photographs as follows: when the film in a camera is moving from right to left and the subject is moving from left to right at such a speed that its image is stationary on the moving film, the image which is obtained represents a true 2-dimensional likeness of the subject. When the speed of the subject's image is not as fast as the speed of the film, the image obtained will appear to have extended and stretched out the features of

the subject. Conversely, the subject will appear compressed if its image moves more quickly than the film. As it is probably evident, motion of the subject's image contrary to that of the film will lead to the greatest compression.

The sharpness of the image is also affected by the relative speed of the subject. There are three possibilities: motion faster, equal or slower than the film speed. A further factor affecting sharpness is, of course, exposure time. However, exposure time is only a determining factor when the subject's image moves more slowly than the film. When their speeds are equal there is no unsharpness caused by subject movement. At high differential speeds the amount of change of the subject due to its lower velocity can be limited by a very narrow slit (in effect by reducing the exposure time) which will maintain image sharpness by keeping blurring caused by image "slippage" within acceptable tolerances. This is not really the case for the situation in which the subject's image moves more quickly than the film. This is due to the fact that a different part of the subject always manages to catch up to any instantaneous section thereby destroying its sharpness by "double exposure."




Kodak
Potassium Dichromate
(BICHROMATE)
DANGER ☠ POISON
1 POUND

## Calendar of Events

### Week 1 - 2

A small manual turntable was built, Figure 4. The camera, a Minolta SR-1, was modified with the addition of a slit and a timing gear drive and brought into its earlier operational condition by making for it a mount to which a Model 14 variable speed mixing motor was attached, similarly equipped with a timing gear. A test run was made by loading the camera with film and with the lens cap on, shooting off the 36 exposures in the film cassette. Next the conditions for photography were established and with the timing belt the motor was coupled to the camera's rewind knob. Then the rewind button on the camera was pressed and the motor started at a fairly slow speed. The film was rewound and pulled by the slit at about 2 inches per second. The subject was a bottle of chemicals which was spun in front of the camera and allowed to come to rest. Upon development variously elongated and compressed views of the bottle could be seen. When a section which looked normal was printed, wrapped around a cylinder and placed next to the original, the potentials of the system became more evident as the likeness was extremely good.

### Week 3 - 4

From a discarded biology apparatus used to monitor


KODAK PANATOMIC X FILM
KODAK SAFETY FILM
KODAK SAFETY FILM
KODAK PANATOMIC X FILM

5

6

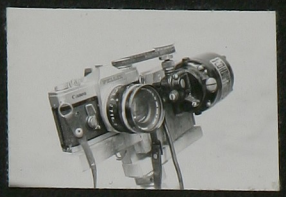
7

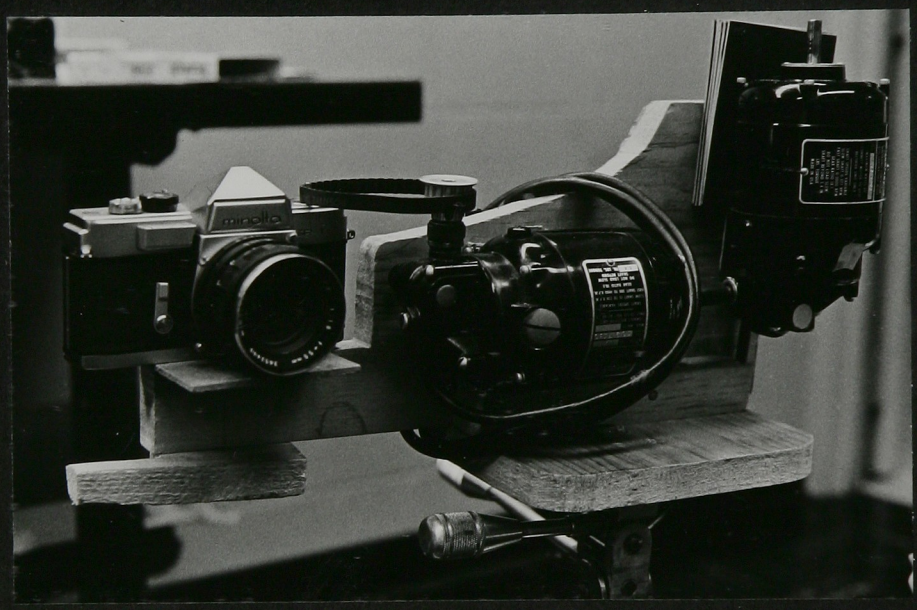
the behavior of cultures in petri dishes a turntable capable of supporting a person was constructed. The rotational speed of the platform could be varied from 1 to 2 revolutions per second. This seemed rather fast but I tried the setup by taking a self portrait. Although I felt a little dizzy after the session, this was attributed to my "weak stomach." Some pictures from this session are presented in contact sheet form in Figure 5. Next a model was procured but after sitting on the turntable for about a minute she became violently ill. The turntable was later given another try with a second model and the pictures which we achieved were very promising. She even managed to stand for a few revolutions. Two pictures which were obtained are Figures 6 and 7. Finally, after this session it became very evident that the system needed to be altered. The following suggestion was made by the model: "The speed of this turntable needs to be reduced."

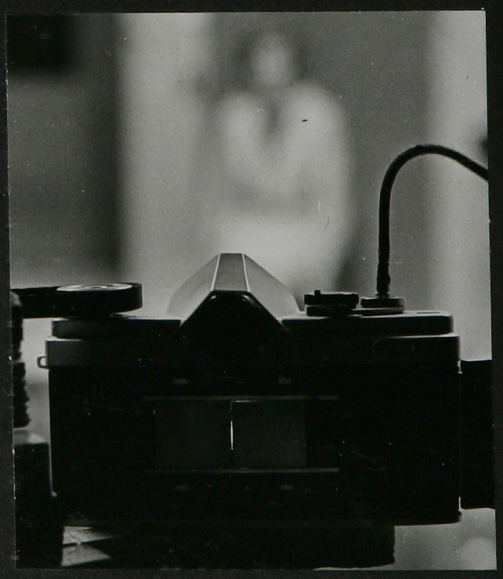
Weeks 5 - 6

I had a conference with Professors Arnold and Remmington in which both were very encouraging about the work done so far. Professor Arnold was very intrigued by the creative possibilities of unsymmetrical rotation and non-spherical subject matter. The subject of a final display was brought up and the idea of a large and several small rotating cylinders was discussed with Professor Barschel.

The speed of the turntable was reduced by coupling the




minolta



drive gear of the turntable to another variable speed mixer motor. Now the film speed could not be reduced enough to match the rotational speed of the subject. To reduce the film speed a second mixer motor (each has a 18:1 reduction gear between fast and slow shafts) was connected to the one already attached to the camera. A view before and after is illustrated in Figure 8. Now the film could be pulled at a minimum rate of about 1 mm. per 10 seconds before the smoothness of film movement was adversely affected by sticking to the pressure plate. Another innovation was the switching of the Minolta camera for a Canon Pellix which was fitted with a hairline under the groundglass in a position which would match the position of the slit in the film plane. Now, the centering of the slit on any subject area could be accomplished even while the film was being exposed. This is due to the fact that the Pellix has a semi-transparent mirror which never moves out of the lens to film path.

The first very successful small cylinders were made of heads and also full length pictures were attempted. The possibilities of changing the appearance of the subject with each revolution were tested and are illustrated by Figure 9.

The large cylinder, of galvanized metal, 20 inches in diameter by 35 inches tall, was ordered. Also, the drive motor for the turning cylinders and the black plastic top were purchased.

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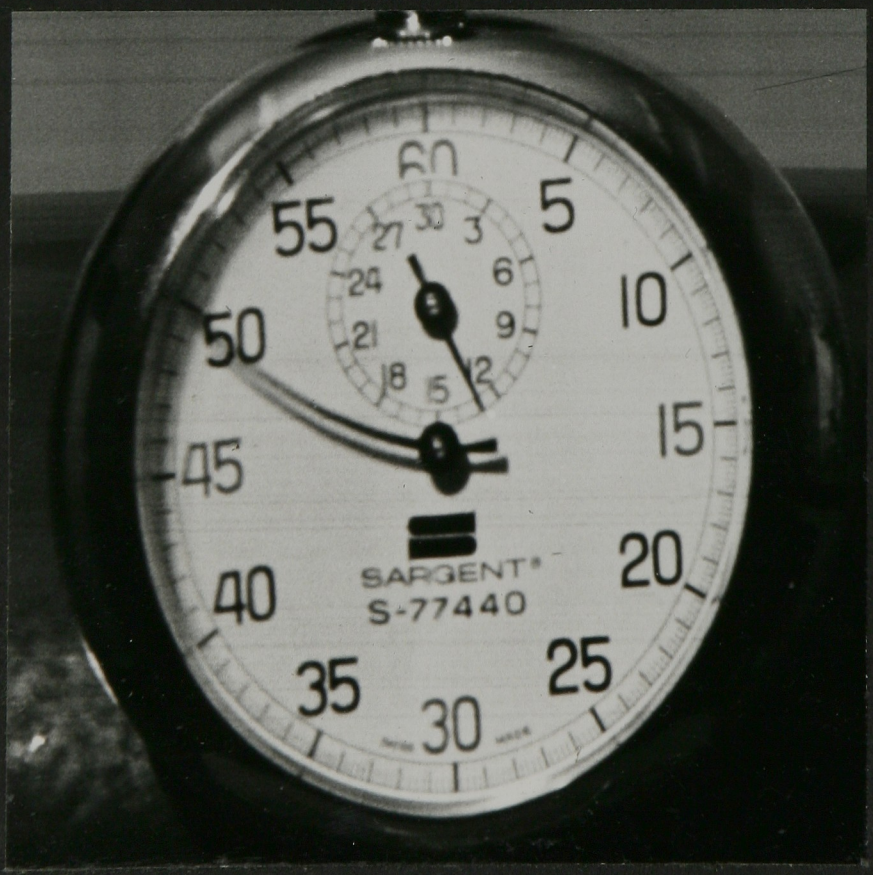


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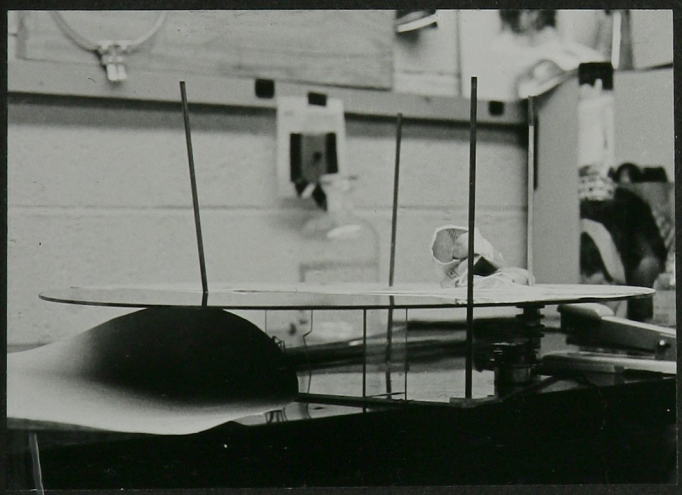

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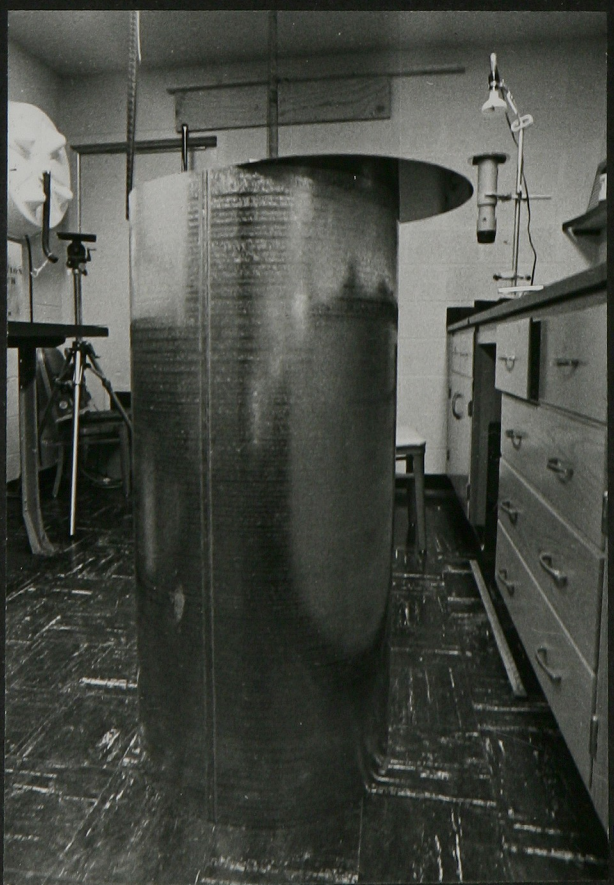

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Weeks 7 - 8

More exposures were made and experiments with plants, Figure 10, and watch, Figure 11, were produced. Since the best images could be obtained mainly from portraits of the head alone extensive attempts at the production of a controlled distortion of the face were undertaken. Part of a sequence illustrating this is shown in Figure 12.

The wrap-around image for the large cylinder was exposed and one of the heads selected. Concurrently the four small cylinders which were to gyrate on the large cylinder were finished and their base was also assembled. Figures 13 and 14 show two views of this cover. The following figure illustrates the finished appearance of two of the small cylinders. I picked up the large metal cylinder and Figure 16 shows it still uncovered.

The large print which was to cover the 20 x 35" cylinder was printed on a spliced length of paper because the photo stores were temporarily out of stock of mural paper. In order to conserve chemicals I decided that permanence of the print would be sacrificed. Therefore, the simplest method of processing was adopted. The paper was exposed, then thoroughly wetted. Next it was laid onto a wet piece of masonite board and developer was sponged onto its face until complete development of all parts had been accomplished. It was fixed and washed by the same means. Four steps in the process are illustrated in Figure 17.

17

18

Weeks 9 - 10

The dried print was mounted onto the cylinder using Spra-ment adhesive. This worked remarkably well and fairly good contact was achieved all over the print, Figure 18. One further shooting session was scheduled and very exciting photographs were obtained of the head in an eccentric position. The display board for the exhibit of the work was designed and the prints made. All the work for display was cleaned and adjusted. Finally it was all transported to the School of Art and Design exhibit area for display on May 23.

## Conclusion

It was for a long time that the basic ideas behind the final production of this work were formulated. This thesis presents a visual application of streak photography not yet attempted by artists (as far as all my inquiries have revealed). The practical experience I have gained from the development of this work has been enormous in both an artistic and technical sense

Unfortunately, time has not permitted a more thorough examination of varied subject matter; however, the basic principles have been detailed and a variety of samples produced which point out the flexibility of this approach as a creative tool.

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